



PLC Integration of RK46C_2111

IO-Link service data function block + process data parser function for Beckhoff (TwinCAT 3.x) PLC systems in combination with a EtherCAT IO-Link Master

© 2024

Leuze electronic GmbH & Co. KG

In der Braike 1

D-73277 Owen / Germany

Phone: +49 7021 573-0

Fax: +49 7021 573-199

<http://www.leuze.com>

info@leuze.com

Table of Contents

1	Legal information.....	4
1.1	Disclaimer.....	4
2	About this document.....	5
2.1	Purpose of use.....	5
2.2	Target group.....	5
3	General use of function block.....	6
3.1	Short description.....	6
3.2	Calling and designation.....	6
3.3	Configuration.....	6
3.4	Method of function.....	7
3.5	Behavior when error occurs.....	7
4	Integration into the PLC project.....	8
5	Process data parser function.....	9
5.1	Calling and designation.....	9
5.2	Configuration.....	9
6	Error description.....	10
7	Data structures.....	11
8	Parameter descriptions.....	17
9	Technical specifications.....	21
9.1	General data.....	21

1 Legal information

1.1 Disclaimer

With the installation, copying or other use of this software product, you agree to the following conditions of use. If you do not agree with the conditions, do not install this software product. If you received the software product by means of download, terminate the download and delete all files that have already been downloaded.

This software product is protected by European and U.S. copyright law and international treaty provisions. You are in no way authorized to rent, lease, lend or sell the software or parts thereof to third parties.

Before you link the library, please close all unnecessary programs to avoid loss of data.

We highly recommend installing the software on a computer which is not already used in the production process or is needed for storing important data. It cannot be completely excluded that existing files will be changed or overwritten. Leuze electronic GmbH & Co. KG is not liable for damages and data loss that result from this installation or the failure to observe this warning notice.

	NOTICE
	<p>Observe the operating instructions!</p> <ul style="list-style-type: none">👉 Observe all safety notices provided in the operating instructions for these devices. Leuze electronic GmbH & Co. KG is not liable for personal injury and property damage that result from failure to comply with these safety notices.👉 Download the operating instructions for these devices at www.leuze.com.

2 About this document

Please read this chapter carefully before working with this documentation and the Leuze IO-Link device.

2.1 Purpose of use

These instructions have been designed for the technical personnel for the use of the IO-Link PLC blocks.

These instructions are intended to provide support during the commissioning of a Leuze IO-Link sensor using standard software from Siemens. The described module is part of this standard software.

2.2 Target group

These instructions are addressed to programming engineers and the operators of machines and systems, which are operated by one or several IO-Link devices. They also address people, who connect the IO-Link device via an IO-Link-Master-Gateway to a PLC-Control for data exchange.

3 General use of function block

3.1 Short description

The function block "FB_Leuze_IOL_ RK46C_2111" simplifies the usage of Leuze IO-Link devices on Beckhoff (TwinCAT 3.x) PLC controls. This FB supports IO-Link Masters which can be connected via EtherCAT to the PLC system.

The function block is device type-specific and thus only suitable for the appropriate Leuze IO-Link devices. The FB interprets the call-up of the acyclic service data between the PLC and the IO-Link device.

The IO-Link function block can only be used in combination with the listed helper functions / libraries.

3.2 Calling and designation



Fig. 3.1: Example of module call

3.3 Configuration

Tab. 3.1: Parameter IN

Parameter	Data type	Description
bExecute	Bool	Positive trigger: Start data transfer
bRW	Bool	Read or write the selected IO-Link parameter. FALSE: Read parameter TRUE: Write Parameter
nPort	T_AmsPort	Port number of the ADS device.
sNetId	T_AmsNetID	String containing the AMS network identifier of the target device to which the ADS command is directed. Beckhoff EL6224/EP6224: AoeNetId of the IO-Link Master
nIdxGroup	UDInt	Index group number.
tTimeOut	Time	Time, after a Timeout-Error is triggered.

Tab. 3.2: Parameter INOUT

Parameter	Data type	Description
stDeviceData	ST_Leuze_IOL_ RK46C_2111	Sensor data

See structure description of ST_Leuze_IOL_ RK46C_2111 in chapter 7.

Tab. 3.3: Parameter OUT

Parameter	Data type	Description
bDone	Bool	Indicates whether data is valid.

Parameter	Data type	Description
bBusy	Bool	Request in process. FALSE: Request is terminated TRUE: Request is being processed
bError	Bool	Error flag FALSE: No error TRUE: Error detected
stErrorCode	ST_Leuze_IOL_Error	Status of the function block

See structure description of ST_Leuze_IOL_Error in chapter 6.

3.4 Method of function

The function block uses the data structure "ST_Leuze_IOL_RK46C_2111". The PLC data structure contains the values of all IO-Link variables. Before you can use it, the structure must be instantiated by a data block. Each IO-Link FB parameter has a data point representing it in this data structure. This data point will be actualized every time a read request was executed successfully.

The desired parameters can be selected via the input variables. Depending on the device definition, IO-Link parameters are read or writable. The input variable must be "bRW" = FALSE to read parameter. The value that should be written can be defined in the data structure, as soon as the input parameter "bRW" = TRUE. You start each transfer by calling up the "FB_Leuze_IOL_RK46C_2111" with a positive trigger at the "bExecute" input. As long as there is no valid answer the output "bBusy" is TRUE. In the case that the chosen timeout period has elapsed a timeout error will be generated and the thread will be terminated. The "bDone" = TRUE output shows that the transmission was successful. The outputs retain there states as long as there is no new positive trigger at the "bExecute" input again.

The function block allows you to read or write multiple IO-Link parameters sequentially (multi-selection). Please note that it may happen, that a single parameter can not be written. The function block aborts at this point and it is possible, that the IO-Link device contains an inconsistent set of parameters.

3.5 Behavior when error occurs

An error bit (bError) is set and an error code (ST_Leuze_IOL_Error) generated, if there is a spurious input value or an incorrect input connection of the FB. In this case, no further processing is carried out, until the input has been corrected.

4 Integration into the PLC project

The function block "FB_Leuze_IOL_ RK46C_2111" is a part of the TwinCAT V3.x library. The library can be installed by using the Library Repository. Afterwards the library can be added to your project (References --> Add library...).

Integration step by step:

- Download the library
- Open the Library repository in Library Manager tab in Beckhoff TwinCAT
- Click Install... and select downloaded library
- Open Add library in Library Manager tab
- Find installed library under Leuze electronic GmbH + Co. KG

NOTICE	
	If several devices connect to the IO-Link Master, you can only exchange acyclic data (service data) with one device at the same time. Due this restriction, the service data communication blocks must to be blocked against each other.

5 Process data parser function

The function `F_Leuze_PD_RK46C_2111` simplifies the interpretation of composed IO-Link process data. This data is provided as a data structure on the PLC side. Some sensors support different process data output. User must select mode of PD according to the sensors settings.

The function is device type-specific and thus only suitable for the appropriated Leuze IO-Link devices.

5.1 Calling and designation



Fig. 5.1: Example of process data parsing function call

5.2 Configuration

Tab. 5.1: Parameters

Parameter name	Declaration	Data type	Description
aProcessData	INPUT	ARRAY OF BYTE	Raw process data of the IO-Link device.
nPDMMode	INPUT	INT	Mode of the PD. User must select mode of PD according to the sensors settings. The PD Mode parameter only appears for some sensors.
bError	OUTPUT	BOOL	Error flag FALSE: No error TRUE: Error detected
F_Leuze_PD_RK46C_2111	OUTPUT	ST_Leuze_PD_RK46C_2111	Reference to the instance of the data structure ST_Leuze_PD_RK46C_2111. The structure includes the disaggregated values of the process data.

See structure description of `ST_Leuze_PD_RK46C_2111` in chapter 7.

6 Error description

The parameter "ErrorCode" can be interpreted using the PLC data type ST_Leuze_IOL_Error. This data type contains the following error information:

Tab. 6.1: ST_Leuze_IOL_Error description

Parameter name	Data type	Description
ErrorStatus.nBlockError	WORD	Error number representing FB where error occurred
ErrorStatus.nAdsReadError	UDINT	ADS read error code
ErrorStatus.nAdsWriteError	UDINT	ADS write error code
ErrorStatus.nIndex	INT	IO-Link index to which the error code refers
ErrorStatus.nSubIndex	INT	IO-Link sub-index to which the error code refers

Tab. 6.2: Error description for nBlockError

Error code (nBlockError)	Error description
0x0000	No error
0x8001	Time out error occurred
0x8002	No parameter selected
0x8003	Error in FB_Leuze_IOL_AdsReadWrite block

For additional information see the Beckhoff ADS Return Codes (<https://infosys.beckhoff.com>).

7 Data structures

Tab. 7.1: ST_Leuze_IOL_RK46C_2111

Parameter name	Data type	Description
stDeviceData.stSelection.stCommands.bCmdDeviceReset	BOOL	[WRITE_ONLY] Device Reset
stDeviceData.stSelection.stCommands.bCmdApplicationReset	BOOL	[WRITE_ONLY] Application Reset
stDeviceData.stSelection.stCommands.bCmdRestoreFactorySettings	BOOL	[WRITE_ONLY] Restore Factory Settings
stDeviceData.stSelection.stCommands.bCmdBackToBox	BOOL	[WRITE_ONLY] Back-to-box
stDeviceData.stSelection.stCommands.bCmdErrorConfirmation	BOOL	[WRITE_ONLY] Error Confirmation
stDeviceData.stSelection.stCommands.bCmdTeach11StandardSensitivity	BOOL	[WRITE_ONLY] Teach 11% (Standard Sensitivity)
stDeviceData.stSelection.stCommands.bCmdTeach30DecreasedSensitivity	BOOL	[WRITE_ONLY] Teach 30% (Decreased Sensitivity)
stDeviceData.stSelection.stCommands.bCmdDarkSwitching	BOOL	[WRITE_ONLY] dark switching
stDeviceData.stSelection.stCommands.bCmdLightSwitching	BOOL	[WRITE_ONLY] light switching
stDeviceData.stSelection.stCommands.bCmdEnableConfigurationMode	BOOL	[WRITE_ONLY] Enable Configuration Mode
stDeviceData.stSelection.stCommands.bCmdReloadLastTeachWorking	BOOL	[WRITE_ONLY] Reload last Teach (WORKING)
stDeviceData.stSelection.stCommands.bCmdRestoreFactoryDefaults	BOOL	[WRITE_ONLY] Restore factory defaults
stDeviceData.stSelection.stCommands.bCmdSaveCurrentParametersToDevice	BOOL	[WRITE_ONLY] Save current parameters to device
stDeviceData.stSelection.stCommands.bCmdEnableSensorMode	BOOL	[WRITE_ONLY] Enable Sensor Mode
stDeviceData.stSelection.stCommands.bCmdEnableAdcSignalProcessDataOutput	BOOL	[WRITE_ONLY] Enable ADC Signal Process Data Output
stDeviceData.stSelection.bSystemCommand	BOOL	[WRITE_ONLY] Application: Command interface for devices without ISDU support. Validity and execution of commands are not confirmed.
stDeviceData.stSelection.stDirectParametersPage1.bAll	BOOL	[READ_WRITE] all parameters of complex data type
stDeviceData.stSelection.stDirectParametersPage1.bReserved_1	BOOL	[READ_ONLY] ; Suffix "_1" (parameter index or subindex) added because of duplicate parameter names.
stDeviceData.stSelection.stDirectParametersPage1.bMasterCycleTime	BOOL	[READ_ONLY] Communication: Current communication cycle duration used by the master. This value defines the process data cycle.

Parameter name	Data type	Description
stDeviceData.stSelection.stDirectParametersPage1. bMinCycleTime	BOOL	[READ_ONLY] Communication: Minimum communication cycle duration supported by the device. This value defines the lowest possible process data cycle.
stDeviceData.stSelection.stDirectParametersPage1. bMSequenceCapability	BOOL	[READ_ONLY] Communication: Information on the structure and the supported features of the communication messages.
stDeviceData.stSelection.stDirectParametersPage1. bloLinkRevisionId	BOOL	[READ_ONLY] Communication: Identifier for the currently used communication protocol revision.
stDeviceData.stSelection.stDirectParametersPage1. bProcessDataInputLength	BOOL	[READ_ONLY] Communication: Information on width and features of the process input data (Process Data from Device to Master).
stDeviceData.stSelection.stDirectParametersPage1. bProcessDataOutputLength	BOOL	[READ_ONLY] Communication: Information on width of the process output data (Process Data from Master to Device).
stDeviceData.stSelection.stDirectParametersPage1.bVendorId1	BOOL	[READ_ONLY] Identification: Highest octet of the Vendor ID. Combined with the parameter Vendor ID 2, this parameter defines the 16-bit value of the unique Vendor ID as assigned by the IO-Link Community.
stDeviceData.stSelection.stDirectParametersPage1.bVendorId2	BOOL	[READ_ONLY] Identification: Lowest octet of the Vendor ID. Combined with the parameter Vendor ID 1, this parameter defines the 16-bit value of the unique Vendor ID as assigned by the IO-Link Community.
stDeviceData.stSelection.stDirectParametersPage1.bDeviceId1	BOOL	[READ_ONLY] Identification: Highest octet of the Device ID. Combined with the parameters Device ID 2 and 3, this parameter defines the 24-bit value of the vendor-specific Device ID.

Parameter name	Data type	Description
stDeviceData.stSelection.stDirectParametersPage1.bDeviceId2	BOOL	[READ_ONLY] Identification: Middle octet of the Device ID. Combined with the parameters Device ID 1 and 3, this parameter defines the 24-bit value of the vendor-specific Device ID.
stDeviceData.stSelection.stDirectParametersPage1.bDeviceId3	BOOL	[READ_ONLY] Identification: Lowest octet of the Device ID. Combined with the parameters Device ID 1 and 2, this parameter defines the 24-bit value of the vendor-specific Device ID.
stDeviceData.stSelection.stDirectParametersPage1.bReserved_13	BOOL	[READ_ONLY] ; Suffix "_13" (parameter index or subindex) added because of duplicate parameter names.
stDeviceData.stSelection.stDirectParametersPage1.bReserved_14	BOOL	[READ_ONLY] ; Suffix "_14" (parameter index or subindex) added because of duplicate parameter names.
stDeviceData.stSelection.stDirectParametersPage1.bReserved_15	BOOL	[READ_ONLY] ; Suffix "_15" (parameter index or subindex) added because of duplicate parameter names.
stDeviceData.stSelection.stDp.bAll	BOOL	[READ_WRITE] all parameters of complex data type
stDeviceData.stData.stCommands.nCmdDeviceReset	UINT	[WRITE_ONLY] Device Reset
stDeviceData.stData.stCommands.nCmdApplicationReset	UINT	[WRITE_ONLY] Application Reset
stDeviceData.stData.stCommands.nCmdRestoreFactorySettings	UINT	[WRITE_ONLY] Restore Factory Settings
stDeviceData.stData.stCommands.nCmdBackToBox	UINT	[WRITE_ONLY] Back-to-box
stDeviceData.stData.stCommands.nCmdErrorConfirmation	UINT	[WRITE_ONLY] Error Confirmation
stDeviceData.stData.stCommands.nCmdTeach11StandardSensitivity	UINT	[WRITE_ONLY] Teach 11% (Standard Sensitivity)
stDeviceData.stData.stCommands.nCmdTeach30DecreasedSensitivity	UINT	[WRITE_ONLY] Teach 30% (Decreased Sensitivity)
stDeviceData.stData.stCommands.nCmdDarkSwitching	UINT	[WRITE_ONLY] dark switching
stDeviceData.stData.stCommands.nCmdLightSwitching	UINT	[WRITE_ONLY] light switching
stDeviceData.stData.stCommands.nCmdEnableConfigurationMode	UINT	[WRITE_ONLY] Enable Configuration Mode
stDeviceData.stData.stCommands.nCmdReloadLastTeachWorking	UINT	[WRITE_ONLY] Reload last Teach (WORKING)

Parameter name	Data type	Description
stDeviceData.stData.stCommands.nCmdRestoreFactoryDefaults	UINT	[WRITE_ONLY] Restore factory defaults
stDeviceData.stData.stCommands.nCmdSaveCurrentParametersToDevice	UINT	[WRITE_ONLY] Save current parameters to device
stDeviceData.stData.stCommands.nCmdEnableSensorMode	UINT	[WRITE_ONLY] Enable Sensor Mode
stDeviceData.stData.stCommands.nCmdEnableAdcSignalProcessDataOutput	UINT	[WRITE_ONLY] Enable ADC Signal Process Data Output
stDeviceData.stData.nSystemCommand	UINT	[WRITE_ONLY] Application: Command interface for devices without ISDU support. Validity and execution of commands are not confirmed.
stDeviceData.stData.stDirectParametersPage1.nReserved_1	UINT	[READ_ONLY] ; Suffix "_1" (parameter index or subindex) added because of duplicate parameter names.
stDeviceData.stData.stDirectParametersPage1.nMasterCycleTime	UINT	[READ_ONLY] Communication: Current communication cycle duration used by the master. This value defines the process data cycle.
stDeviceData.stData.stDirectParametersPage1.nMinCycleTime	UINT	[READ_ONLY] Communication: Minimum communication cycle duration supported by the device. This value defines the lowest possible process data cycle.
stDeviceData.stData.stDirectParametersPage1.nMSequenceCapability	UINT	[READ_ONLY] Communication: Information on the structure and the supported features of the communication messages.
stDeviceData.stData.stDirectParametersPage1.nIoLinkRevisionId	UINT	[READ_ONLY] Communication: Identifier for the currently used communication protocol revision.
stDeviceData.stData.stDirectParametersPage1.nProcessDataInputLength	UINT	[READ_ONLY] Communication: Information on width and features of the process input data (Process Data from Device to Master).
stDeviceData.stData.stDirectParametersPage1.nProcessDataOutputLength	UINT	[READ_ONLY] Communication: Information on width of the process output data (Process Data from Master to Device).

Parameter name	Data type	Description
stDeviceData.stData.stDirectParametersPage1.nVendorId1	UINT	[READ_ONLY] Identification: Highest octet of the Vendor ID. Combined with the parameter Vendor ID 2, this parameter defines the 16-bit value of the unique Vendor ID as assigned by the IO-Link Community.
stDeviceData.stData.stDirectParametersPage1.nVendorId2	UINT	[READ_ONLY] Identification: Lowest octet of the Vendor ID. Combined with the parameter Vendor ID 1, this parameter defines the 16-bit value of the unique Vendor ID as assigned by the IO-Link Community.
stDeviceData.stData.stDirectParametersPage1.nDeviceId1	UINT	[READ_ONLY] Identification: Highest octet of the Device ID. Combined with the parameters Device ID 2 and 3, this parameter defines the 24-bit value of the vendor-specific Device ID.
stDeviceData.stData.stDirectParametersPage1.nDeviceId2	UINT	[READ_ONLY] Identification: Middle octet of the Device ID. Combined with the parameters Device ID 1 and 3, this parameter defines the 24-bit value of the vendor-specific Device ID.
stDeviceData.stData.stDirectParametersPage1.nDeviceId3	UINT	[READ_ONLY] Identification: Lowest octet of the Device ID. Combined with the parameters Device ID 1 and 2, this parameter defines the 24-bit value of the vendor-specific Device ID.
stDeviceData.stData.stDirectParametersPage1.nReserved_13	UINT	[READ_ONLY] ; Suffix "_13" (parameter index or subindex) added because of duplicate parameter names.
stDeviceData.stData.stDirectParametersPage1.nReserved_14	UINT	[READ_ONLY] ; Suffix "_14" (parameter index or subindex) added because of duplicate parameter names.
stDeviceData.stData.stDirectParametersPage1.nReserved_15	UINT	[READ_ONLY] ; Suffix "_15" (parameter index or subindex) added because of duplicate parameter names.
stDeviceData.stData.stDp.nOffLimit	UINT	[READ_WRITE] Off Limit

Parameter name	Data type	Description
stDeviceData.stData.stDp.nOnLimit	UINT	[READ_WRITE] On Limit
stDeviceData.stData.stDp.bKeyLock	BOOL	[READ_WRITE] Key Lock; IO-Link Parameter overrides IN2 Input/PD
stDeviceData.stData.stDp.nQ2LogicFunction	UINT	[READ_WRITE]
stDeviceData.stData.stDp.nDelayFunctionInternalDelayUnit	UINT	[READ_WRITE] Operating mode of the internal delay unit
stDeviceData.stData.stDp.nTimeBaseInternalDelayUnit	UINT	[READ_WRITE] 1ms, 10ms, 100ms, 1000ms
stDeviceData.stData.stDp.nMultiplicationFactorForTimeBaseInternalDelayUnit	UINT	[READ_WRITE] 1-15
stDeviceData.stData.stDp.bLightDarkSwitching	BOOL	[READ_WRITE] Light/Dark Switching: adjusting the switching behavior of the switching output
stDeviceData.stData.stDp.bInternalDelayUnitBasedOnObject	BOOL	[READ_WRITE] Enable Internal Delay Unit
stDeviceData.stData.stDp.nPdiContent	UINT	[READ_ONLY]
stDeviceData.stData.stDp.bStatusTeachCommand	BOOL	[READ_ONLY] Value is re-read after new command. All status bits are valid after finished command.
stDeviceData.stData.stDp.bCommandAccepted	BOOL	[READ_ONLY]
stDeviceData.stData.stDp.bTeachError	BOOL	[READ_ONLY]
stDeviceData.stData.stDp.bLastValuesRestored	BOOL	[READ_ONLY]
stDeviceData.stData.stDp.bReceptionLevelTooHigh	BOOL	[READ_ONLY]
stDeviceData.stData.stDp.bReceptionLevelTooLow	BOOL	[READ_ONLY]

Tab. 7.2: ST_Leuze_PD_RK46C_2111

Parameter name	Data type	Description
ST_Leuze_PD_RK46C_2111.stMode_0.cQ	BOOL	
ST_Leuze_PD_RK46C_2111.stMode_0.bWarning	BOOL	
ST_Leuze_PD_RK46C_2111.stMode_0.bStatus	BOOL	
ST_Leuze_PD_RK46C_2111.stMode_1.cQ	BOOL	
ST_Leuze_PD_RK46C_2111.stMode_1.nReceivedSignal	UINT	

8 Parameter descriptions

Tab. 8.1: IODD parameter descriptions

(AR - Access Rights, R - Read only, W - Write only, RW - Read and Write, NS - Not specified)

Parameter	Index	Subindex	Data type	Default	AR	Description
Commands			RecordT		W	Application: Command interface for devices without ISDU support. Validity and execution of commands are not confirmed.
Device Reset			UIntegerT	128	W	Device Reset
Application Reset			UIntegerT	129	W	Application Reset
Restore Factory Settings			UIntegerT	130	W	Restore Factory Settings
Back-to-box			UIntegerT	131	W	Back-to-box
Error Confirmation			UIntegerT	160	W	Error Confirmation
Teach 11% (Standard Sensitivity)			UIntegerT	161	W	Teach 11% (Standard Sensitivity)
Teach 30% (Decreased Sensitivity)			UIntegerT	162	W	Teach 30% (Decreased Sensitivity)
dark switching			UIntegerT	163	W	dark switching
light switching			UIntegerT	164	W	light switching
Enable Configuration Mode			UIntegerT	170	W	Enable Configuration Mode
Reload last Teach (WORKING)			UIntegerT	171	W	Reload last Teach (WORKING)
Restore factory defaults			UIntegerT	172	W	Restore factory defaults
Save current parameters to device			UIntegerT	173	W	Save current parameters to device
Enable Sensor Mode			UIntegerT	174	W	Enable Sensor Mode
Enable ADC Signal Process Data Output			UIntegerT	191	W	Enable ADC Signal Process Data Output
Direct Parameters - Page 1	0	0	RecordT		RW	Comprises the required parameters defining the communication characteristics and identifiers for device validation.
Reserved	0	1	UIntegerT		R	
Master Cycle Time	0	2	UIntegerT	0	R	Communication: Current communication cycle duration used by the master. This value defines the process data cycle.
Min Cycle Time	0	3	UIntegerT	23	R	Communication: Minimum communication cycle duration supported by the device. This value defines the lowest possible process data cycle.
M-Sequence Capability	0	4	UIntegerT	0	R	Communication: Information on the structure and the supported features of the communication messages.

Parameter	Index	Subindex	Data type	Default	AR	Description
IO-Link Revision ID	0	5	UIntegerT	17	R	Communication: Identifier for the currently used communication protocol revision.
Process Data Input Length	0	6	UIntegerT	72	R	Communication: Information on width and features of the process input data (Process Data from Device to Master).
Process Data Output Length	0	7	UIntegerT	1	R	Communication: Information on width of the process output data (Process Data from Master to Device).
Vendor ID 1	0	8	UIntegerT	1	R	Identification: Highest octet of the Vendor ID. Combined with the parameter Vendor ID 2, this parameter defines the 16-bit value of the unique Vendor ID as assigned by the IO-Link Community.
Vendor ID 2	0	9	UIntegerT	82	R	Identification: Lowest octet of the Vendor ID. Combined with the parameter Vendor ID 1, this parameter defines the 16-bit value of the unique Vendor ID as assigned by the IO-Link Community.
Device ID 1	0	10	UIntegerT	0	R	Identification: Highest octet of the Device ID. Combined with the parameters Device ID 2 and 3, this parameter defines the 24-bit value of the vendor-specific Device ID.
Device ID 2	0	11	UIntegerT	8	R	Identification: Middle octet of the Device ID. Combined with the parameters Device ID 1 and 3, this parameter defines the 24-bit value of the vendor-specific Device ID.
Device ID 3	0	12	UIntegerT	63	R	Identification: Lowest octet of the Device ID. Combined with the parameters Device ID 1 and 2, this parameter defines the 24-bit value of the vendor-specific Device ID.
Reserved	0	13	UIntegerT		R	
Reserved	0	14	UIntegerT		R	
Reserved	0	15	UIntegerT		R	

Parameter	Index	Subindex	Data type	Default	AR	Description
System Command	0	16	UIntegerT		W	<p>Application: Command interface for devices without ISDU support. Validity and execution of commands are not confirmed.</p> <p>(0 ... 63): Reserved 128: Device Reset 129: Application Reset 130: Restore Factory Settings 131: Back-to-box (132 ... 159): Reserved 160: Error Confirmation 161: Teach 11% (Standard Sensitivity) 162: Teach 30% (Decreased Sensitivity) 163: dark switching 164: light switching 170: Enable Configuration Mode 171: Reload last Teach (WORKING) 172: Restore factory defaults 173: Save current parameters to device 174: Enable Sensor Mode 191: Enable ADC Signal Process Data Output</p>
DP	1	0	RecordT		RW	
Off Limit	1	2	UIntegerT		RW	Off Limit
On Limit	1	3	UIntegerT		RW	On Limit
Key Lock	1	6	BooleanT	0	RW	<p>Key Lock; IO-Link Parameter overrides IN2 Input/PD</p> <p>False: Disabled True: Enabled</p>
Q2 logic function	1	8	UIntegerT	0	RW	<p>0: Inverted Switching Output 1: Switching Output 2: Warning Output</p>
Delay Function (internal delay unit)	1	10	UIntegerT	1	RW	<p>Operating mode of the internal delay unit</p> <p>0: On delay 1: Off delay 2: pulse stretching 3: pulse suppression</p>
Time base (internal delay unit)	1	11	UIntegerT	3	RW	<p>1ms, 10ms, 100ms, 1000ms</p> <p>0: 1ms 1: 10ms 2: 100ms 3: 1000ms</p>
Multiplication factor for time base (internal delay unit)	1	12	UIntegerT	5	RW	1-15
Light/Dark Switching	1	18	BooleanT	0	RW	<p>Light/Dark Switching: adjusting the switching behavior of the switching output</p> <p>False: light switching True: dark switching</p>
Internal Delay Unit (based on object)	1	20	BooleanT	0	RW	<p>Enable Internal Delay Unit</p> <p>False: Disabled True: Enabled</p>

Parameter	Index	Subindex	Data type	Default	AR	Description
PDI Content	1	26	UIntegerT	0	R	0: Switching Signal and Status 1: Analog ADC value and Switching Signal
Status Teach/Command	1	32	BooleanT	0	R	Value is re-read after new command. All status bits are valid after finished command. False: finished True: running
Command accepted	1	33	BooleanT	0	R	False: no True: yes
Teach Error	1	36	BooleanT	0	R	False: no True: yes
Last values restored	1	37	BooleanT	0	R	False: no True: yes
Reception level too high	1	38	BooleanT	0	R	False: no True: yes
Reception level too low	1	39	BooleanT	0	R	False: no True: yes

9 Technical specifications

9.1 General data

Tab. 9.1: Sensor and IODD version

IODD version	V1.0
IODD release date	2023-10-13
Device family	RK46C
Device ID	2111
Device name	RK46C.DL3/LP
Device variants	RK46C_2111 IO-Link (RK46C_2111)